REMARKS

Claims 21-40 remain in the application.

The Examiner has rejected Claim 21 under 35 U.S.C. §103(c) as being obvious over Tepman (U.S. Patent 5,455,197) in view of Ghanbari et al. (U.S. Patent 5,455,197, hereafter Ghanbari). The Examiner is requested to withdraw this rejection.

First of all, neither reference shows a magnet array that surrounds a substrate surface of the substrate support. Tepman's magnets 11, as the Examiner is willing to admit, is positioned in back of the substrate support surface. The Examiner's characterization of Tepman's magnetic field is not clear. Since Tepman is using his magnets 11 as a magnetron for sputtering the acceptor 11, just as the magnets 1 are used to sputter the target 2, it is assumed they have similar configuration. In particular, conventional magnetrons have closely spaced opposed (N and S) pole form, for example, by horseshoe magnets having a shape of a single one of Tepman's magnets 1 or 11. A plurality of such horseshow magnets are arranged in a closed loop although Tepman illustrates only two of the horseshoe magnets in each loop. The resultant magnetic field is semi-toroidal around the short axis of the toroid.

Ghanbari is somewhat more ambiguous about the positioning of permanent magnet packs 40c in FIG. 2. He provides no side view relating the elevation of the magnet packs 40c and the elevation of the wafer 32. Although Ghanbari states at col. 4, ll. 62-62 that the auxiliary magnet 40 surrounds the circular edge or periphery of the wafer, he immediately references FIG. 1, which clearly shows the solenoid electromagnets 40a positioned well behind the front surface of the support 30 supporting the wafer 32. It is well known that a circular array of vertically magnetized magnets creates an axial magnetic field similar to that from a solenoid electromagnets. That is, Ghanbari's permanent magnets as well are taught as being placed behind the wafer surface. A reference must be read as a whole, and the figure is much clearer than the text that Ghanbari's magnet array is positioned behind the wafer support area. Ghanbari's description of permanent magnet packs 40c at col. 5, ll. 10-15 speaks of them as

substitutes for the electromagnets 40a with no suggestion that their position be moved upwardly.

Secondly, Claim 21 requires that the magnet array create a magnetic field that is substantially parallel to the substrate support surface. In contrast, as Ghanbari illustrates in FIG. 2 and describes at col. 4, ll. 65-67 , his magnets "produce a magnetic field 42 that has a component that is perpendicular to the wafer 32." The Examiner cannot simply pick out the furthest loop portion of Ghanbari's magnetic field 42 and state that the magnetic field 42 is therefore substantially parallel to the wafer support surface. A new dependent claim has been added requiring that the magnetic field be parallel at the wafer support surface, as supported at page 8, ll. 2, 3. Ghanbari clearly shows a mostly perpendicular orientation at the wafer surface. Further, if Ghanbari's permanent magnets were placed at the wafer periphery, as the Examiner is attempting to conclude, his magnetic field at the wafer support surface would be almost completely perpendicular.

Another dependent claim has been added horizontally magnetized magnets, as supported in FIG. 3 as filed. Yet another dependent claim has been added for the Halbach magnet array, as supported at page 5, ll. 1,2 and illustrated in FIG. 3. Although Halbach magnet arrays are known, their use for orienting a magnetic film is not suggested in the applied art.

The Examiner has rejected Claim 22 under 35 U.S.C. §103(a) as being obvious over Tepman in view of Ghanbari and further in view of Hsu (U.S. Patent 5,589,039). This rejection is traversed as an unobvious combination. Admittedly, Hsu discloses sputter depositing a magnetic material and further requires that the magnetic field near the wafer be generally parallel to the wafer surface along a single direction. He, however, accomplishes such a field with vertically oriented electromagnets having pole pieces on the sides of the wafer. Further, his electromagnet configuration is not concentrically positioned but instead is predominantly positioned on two opposed rectangular sides. Using the magnet configuration of either Tepman or Ghanbari to sputter Hsu's magnetic material would be ineffective and run contrary to Hsu's teaching of a single magnetic field direction. Tepman's magnets create, as the Examiner admits, a U-shaped annular magnetic field. This field is perpendicular to the wafer at the wafer surface,

thus being completely opposed to Hsu's teach. Further, Tepman's magnetic field is confined to a relatively small area of the wafer and is not effective for full wafer coverage. Ghanbari's magnetic field configuration is more complex, but is predominantly perpendicular to the wafer at the wafer surface, contrary to Hsu's teaching. Indeed, Ghanbari at col. 4, ll. 66, 67 emphasizes this perpendicularity. The Examiner has failed to find art for using a concentric magnet array to create a horizontal magnetic field at the wafer surface.

The Examiner has rejected Claims 23, 25, and 26 under 37 U.S.C. §103(a) as being obvious over Tepman in view of Ghanbari and Hsu and further in view of Boys et al. (U.S. Patent 4,500,409, hereafter Boys). Boys discloses sputtering a magnetic target with an electromagnet magnetron. He also refers to a throw of 63 mm. Otherwise, Boys is not relevant. Claims 23 and 25 depend upon Claim 22, which is believed to be in allowable form, and should therefore also be allowable. Claim 26 depends upon Claim 21, which is believed to be in allowable form, and should therefore also be allowable.

The Examiner has rejected Claims 27-31 under 35 U.S.C. §103(a) as being obvious over Alex (U.S. Patent 5,616,218) in view of Boys and Ghanbari. This rejection is traversed for a number of reasons.

First, the Examiner has failed to find support in the prior art for grounding the collimator. In prior rejections, the Examiner states that because collimators are supported inside grounded chambers, they are assumed to be grounded. This conclusion is not supported.

Secondly, none of Alex, Boys, and Ghanbari discloses an annular magnet array concentrically disposed around a perimeter of the surface of the wafer. Alex discloses no magnet, and further magnetic ordering is inconsistent with Alex's controlled inclination of easy polarization axis. As has been previously argued, Ghanbari's magnets are disposed in back of the wafer. Boys' magnets are part of the magnetron in back of the target and in no way disposed around a perimeter of the substrate. are not arranged concentrically. Further, Alex and Boys on one hand and Ghanbari on the other are directed to two different types of sputtering, magnetic material or metal texture layers for Alex and Boys and TiN barrier layers for Ghanbari. The

combination of the three references references is not adequately supported in the art.

Claim 31 recites a function for the grounded collimator not found in the applied art. No art has been cited for the combination of a collimator and magnetic field below the collimator. Hence, the art cannot be held to support the recited function of the collimator reducing interference with the parallel magnetic field.

Several dependent method claims have been added for restrictions found in the newly submitted dependent apparatus claims.

The Examiner's attention is drawn to co-pending application Serial No. 10/068,669 filed February 2, 2002. Both applications have now been assigned to the responsibility of the undersigned attorney, who will attempt to disentangle separate the two applications as required. The Examiner is invited to review the art already cited in the unexamined '669 application, in particular U.S. Patents Nos.: 5,519,373; 5,593,551; and 6,014,943.

The Examiner is requested to withdraw the finality of the first office action after filing of the request for continued examination (RCE). First, as stated above, the claims are believed to be allowable. Secondly, Applicants filed with the RCE new claims containing limitations not contained in prior claims, e.g. "positioned around an outer perimeter" of the substrate surface rather than "positioned about" such surface. Applicants, at the Examiner's prompting, were attempting to draw the claims to a different invention from that rejected in the prior office action. Applicants deserve an opportunity to respond to the Examiner's interpretation of this new language.

Entry of these amendments after final rejection is requested under 37 CFR §1.116 because the final rejection is considered faulty and premature.

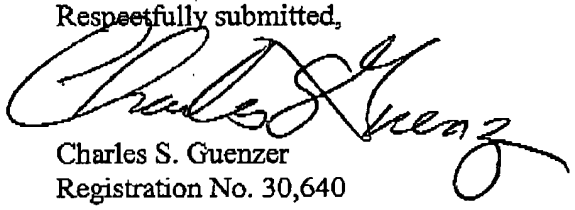
3600.2406
October 25, 2002 (1:46PM)

Docket: AM-2406

In view of the above amendments and remarks, reconsideration and allowance of all claims are respectfully requested. If the Examiner believes that a telephone interview would be helpful, he is invited to contact the undersigned attorney at the listed telephone number, which is on California time.

Date: 10/25/02

Respectfully submitted,



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Version with markings to show changes made

Please add the following new claims:

32. (New) The apparatus of claim 21, wherein said magnetic field at said substrate surface is substantially parallel to said substrate surface.

33. (New) The apparatus of Claim 21, wherein said annular magnet array comprises a plurality of permanent magnets.

34. (New) The apparatus of Claim 33, wherein said plurality of permanent magnets are magnetized parallel to a plane of said substrate surface

35. (New) The apparatus of Claim 21, wherein said annular magnet array is a Halbach array.

36. (New) The method of Claim 27 wherein said target comprises a material that is magnetic when sputter deposited in a substantially parallel magnetic field.

37. (New) The method of Claim 27, wherein said annular magnet array comprises an array of permanent magnets magnetized parallel to a plane of the surface of the substrate during sputtering.

38. (New) The method of Claim 27, wherein said annular magnet array comprises a Halbach array.

39. (New) The method of Claim 27, wherein said magnetic field at the surface of the

substrate is substantially parallel to the surface of said substrate.

40. (New) The method of Claim 27, wherein the substrate is processed to form a magnetic recording head.